

Atty. Docket No. OPP031047US
Serial No: 10/751,172

Amendments to the Claims

Please amend Claim 15 as shown below. This listing of Claims replaces all prior versions and listings of the Claims in this application.

Listing of Claims

1. (Original) A method of manufacturing silicide, comprising the steps of:
 - (a) cleaning a semiconductor substrate with a transistor formed thereon, the transistor including a source electrode, a drain electrode and a gate electrode;
 - (b) placing the cleaned semiconductor substrate into a sputter chamber in a deposition equipment, and forming silicide at the same time of depositing a metal film under a state where the semiconductor substrate is heated at a temperature of 450 - 600°C;
 - (c) removing residual metal film not used for the formation of silicide; and
 - (d) annealing the semiconductor substrate.
2. (Original) The method of claim 1, wherein, in the step (b), silicide with a composition ratio of CoSi is formed.
3. (Original) The method of claim 2, wherein the step (a) includes a first cleaning step of cleaning the semiconductor substrate using SC1 solution.
4. (Original) The method of claim 3, wherein the step (a) further includes a second cleaning step of cleaning the semiconductor substrate using HF or DHF solution.
5. (Original) The method of claim 1, wherein the step (a) further includes a third cleaning step of plasma-etching the semiconductor substrate in the sputter chamber.

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6. (Original) The method of claim 5, wherein the third cleaning step includes a first etching step using RF power of 60 – 90W and a second etching step of RF power of 250 – 350W.

7. (Original) The method of claim 5, wherein the third cleaning step uses argon gas of 8 – 15sccm.

8. (Original) The method of claim 2, wherein, in the step (b), the semiconductor substrate is heated at a temperature of 450 – 600°C.

9. (Original) The method of claim 8, wherein, in the step (b), the metal film is formed by using a cobalt sputter with DC power of 2 – 10kW.

10. (Original) The method of claim 8, wherein, in the step (b), argon gas of 40 – 70 sccm is used as gas for a sputtering process, and argon gas of 8 – 15sccm is used as gas for heating the semiconductor.

11. (Original) The method of claim 2, wherein the step (c) includes a first removal step of removing the metal film during 5 – 15 minutes in SPM solution at a temperature of 50 – 150°C and a second removal step of removing the metal film during 3 – 10 minutes in SC1 solution at a temperature of 40 – 70°C.

12. (Original) The method of claim 2, wherein the step (d) includes heating the semiconductor substrate during 10 – 60 seconds at a temperature of 700 – 950°C in a RTP equipment.

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13. (Original) The method of claim 2, wherein the step (d) includes heating the semiconductor substrate during 20 - 60 minutes at a temperature of 500 - 900°C in an electric furnace.

14. (Original) The method of claim 2, wherein, the silicide annealed in the step (d) comprises a composition of CoSi_2 .

15. (Currently Amended) A semiconductor device with the silicide manufactured according to any one of the preceding claims 1 to 13, comprising:

- a semiconductor substrate including device isolation regions;
- transistors provided in respective device regions of the semiconductor substrate, each of the transistors including a gate electrode, a source electrode and a drain electrode;
- a PMD (pre-metal dielectric) provided on the semiconductor substrate, the PMD including contact holes to expose a portion of regions of the gate, source and drain electrodes;
- contacts provided within the contact holes;
- metal wire layers provided on the PMD and connected to the contacts; and
- silicide with a composition of CoSi_2 provided in the transistors so that contact resistances of the contacts are reduced.

16. (Original) The semiconductor device of claim 15, wherein the silicide comprises a composition of CoSi_2 .